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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/767,230	01/22/2001	Andreas H. Hielscher	0887-4150US1	1470
27123	7590	07/18/2006	EXAMINER	
MORGAN & FINNEGAN, L.L.P. 3 WORLD FINANCIAL CENTER NEW YORK, NY 10281-2101			JUNG, WILLIAM C	
			ART UNIT	PAPER NUMBER
			3768	
DATE MAILED: 07/18/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/767,230

Applicant(s)

HIELSCHER ET AL.

Examiner

William Jung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12, 15-17, 19-37, 40, 43-45 and 47-60 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 13, 14, 18, 38, 39, 41, 42 and 46 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>06092006</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-60 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1, 9, 12, 15, 19-23, 28, 29, 37, 40, 43, 47-51, and 56-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Schotland* (US 5,787,888) in view of *Vartanian* (US 6,163,589).

Schotland substantially discloses all claimed features in claims 1, 9, 12, 15, 19-23, 28, 29, 37, 40, 43, 47-51, and 56-60.

**Claims 1, 15, 28, 29, and 43:** Schotland discloses a method and a system for reconstructing an image of a scattering medium comprising a source directing energy into the scattering medium at source location on the scattering medium, a detector for measuring the energy emitted from the scattering medium at a detector location on the scattering medium, an internal properties of the scattering medium, means for using an equation of radiative transfer to predict and generate a function of radiative diffusion through the scattering medium, means for generating gradient of the objective function, means for modifying the properties of the scattering medium based on the gradient of the objective function, and means for generating an

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representation of the internal properties of the scattering medium. Schotland further includes method where properties including at least one of scattering coefficient, an absorption coefficient, an anisotropy factor, and a scattering phase function (col. 4, line – col. 5, line 15; col. 5, line 66 - col. 6, line 14; col. 6, lines 33-62; col. 7, lines 38-54). However, Schotland does not explicitly state that the radiative transfer of the scattering from the scattering medium is a prediction based on function of initial guess. However, this feature is well known in the art, specifically in x-ray radiation imaging where x-ray radiation goes through scattering that can be predicted by using modeled or initial guess of the scattering boundary based on probabilistic or stochastic process such as Monte Carlo correction as illustrated by Vartanian (col. 2, line 57 – col. 3, line 15, col. 3, line 58 – col. 4, line 27). Therefore, it would have been obvious to one having an ordinary skill in the art at the time the invention was made to apply Vartanian's prediction function of x-ray scattering based on initial guess (a priori knowledge) of the scattering characteristics of the region of interest with Schotland's imaging reconstruction method and system to achieve the claimed invention.

**Claim 56:** Schotland further discloses in addition to the system described above where the imaging includes spatial distribution of optical properties of tissue (col. 5, line 66 – col. 6, line 14).

**Claims 57-60:** Schotland discloses in figures 1 and 7 where the system described above includes computer processor 650, which executes computer codes 730 to obtain reconstructed images. More specifically, the computer codes include algorithms to carry out the means described above.

**Claims 9, 12, 37, and 40:** Schotland discloses that the radiative transfer is detected as the radiative source is diffused in scattering medium such as tissue. And the diffusion process of the scattering medium therefore is inherently a time dependent function.

**Claims 19-22 and 47-50:** Schotland discloses a computational method where the objective function is minimized, which includes minimizing at least in one-dimensional line along a direction of the gradient (col. 11, line 29 – col. 12, line 8).

**Claims 23 and 51:** Schotland discloses that the method above includes energy near infrared energy (col. 10, lines 51-55).

4. Claims 2-8, 16, 17, 24-27, 30-36, 44, 45, and 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Schotland* and *Vartanian* as applied to claims 1 and 29 above, and further in view of *Muraca et al* (US 5,865,754).

Schotland and Vartanian substantially disclose all claimed features in claims 2-8, 16, 17, 24-27, 30-36, 44, 45, and 52-55. However, neither Schotland nor Vartanian discloses or imply setting threshold (claims 2 and 30). In addition, neither Schotland nor Vartanian anticipates boundary condition or iterative process to determine the predicted absorption coefficient (claims 3-8 and 31-36). Also, neither Schotland nor Vartanian discloses comparison method and normalization to adjust the objective function of the energy.

**Claims 2-8 and 30-36:** Sevvick-Muraca et al disclose fluorescence imaging method and system where the diffusivity of the radiative scattering is determined using threshold setting and iterative process to determine the predicted absorption coefficient (col. 4, lines 51-65; col. 6, lines 19-58; col. 9, lines 13-30).

**Claims 16, 17, 24-27, 44, 45, and 52-55:** In addition to disclosures above, Sevick-Muraca et al disclose comparison stage 240 to compare the predicted and measured energy iteratively, and normalizing the detected energy obtained as described by the Jacobian matrices shown in equations 7 and 8 (col. 9, line 13 – col. 10, line 28).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time the invention was made to apply Sevick-Muraca et al's teaching described above to improve method and system of device such as Schotland's and Vartanian's method and system of reconstructing scattering energy through the target medium to achieve claimed invention.

***Allowable Subject Matter***

5. Claims 10, 11, 13, 14, 18, 38, 39, 41, 42, and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Jung, Ph.D. whose telephone number is 571-272-4739. The examiner can normally be reached on Mon-Fri 8:30 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on 571-272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*WJ*

July 8, 2006

  
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